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NEW OR PECULIAR ZYGOMYCETES. 3: BLAKESLEA,
DISSOPHORA, AND HAPLOSPORANGIUM,
NOVA GENERA¹

ROLAND THAXTER

(WITH PLATES XXVI-XXIX)

Blakeslea, nov. gen.

Mycelium copious, cottony; hyphae very irregular in diameter, the copious branches often rhizoidal and contorted and producing numerous intercalary chlamydospores. Sporangia of two types with numerous intergrading variations: larger solitary sporangia like those of *Choanephora*, with columella and dark appendiculate sporangiospores; and sporangiola without columella, containing few dark appendiculate spores and covering the surface of large spherical sporangioliiferous heads to which they are attached by a vesicular basal piece; the heads solitary on the ends of erect fertile hyphae or produced in clusters from the numerous ultimate branchlets which may result from the successive branching of the latter.

Blakeslea trispora, nov. sp.—Plates XXVI and XXVII.

Mycelium colorless to bright orange. Fertile hyphae stout, erect, arising laterally or terminally, very variable in size. Sporangia spherical, nodding or circinate, very variable; the larger spherical with a rough granular wall, the columella from hemispherical to more elongate; the smaller more conspicuously and coarsely roughened, as is often the distal end or more rarely the whole of the sporangiophore, with spores often distinctly larger and the columella frequently obsolete. Sporangioliferous heads solitary, with fewer, twelve or more, sporangiola; or typically in groups of ten or more each bearing forty or more sporangiola and terminating branchlets of the subdichotomously branched extremity of the fertile hypha, the branches and branchlets of which are

¹ Contributions from the Cryptogamic Laboratories of Harvard University, LXXV.

marked by irregular successive constrictions; the sporangiola typically three-spored, rarely four or six-spored, broadly elliptical, falling from the small nearly spherical vesicle which bears them, or, if not fully matured, carrying the latter with them. Spores from all types of sporangia purplish to reddish brown, marked by sub-labyrinthine longitudinal ridges and furrows, oval or long-elliptical, those from the sporangiola at first somewhat three-sided from pressure, bearing a group of straight fine radiating appendages from either pole. Spores very variable; those of the larger sporangia $8-10 \times 4 \mu$; from smaller sporangia $10-13 \times 5-8 \mu$; from sporangiola, average $12 \times 5 \mu$. Larger sporangia $40-50 \mu$; smaller to 16μ ; sporangiola, average $11-12 \times 13-14 \mu$; the vesicle $3-3.5 \mu$. Chlamydospores very variable, average $17-24 \times 8-18 \mu$.

This interesting type, which has been named in honor of Professor A. F. BLAKESLEE in recognition of his brilliant researches on the Mucorales, appeared as an impurity in a transfer of *Botrytis Rileyi* which was kindly sent me several years ago, together with specimens of the affected larvae, by Professor FAWCETT. The larvae attacked by the *Botrytis* were found on cowpeas at Gainesville, Florida, and it seems probable that the spores of the present fungus, which may have been growing on the faded flowers of this plant, were accidentally transferred to the diseased insect.

The fungus fruits readily on various agar media and does not appear to lose its power of spore production, like species of *Choanephora*, after continued cultivation on nutrients. When first cultivated, the fatty protoplasm of the hyphae was usually bright orange yellow, so that the mycelium as a whole was strikingly colored; but after continuous culture for several years on potato agar, this characteristic has disappeared, or the mycelium retains only a slightly yellowish tint. The mycelium grows very rapidly, and in two or three days the sporangiola begin to be produced in abundance, each fertile hypha bearing from one to a dozen sporangioliferous heads, which under a hand lens resemble exactly in color and appearance the ordinary "conidial" fructifications of *Choanephora*. Instead, however, of producing a primary head from the surface of which the conidial heads arise, as in the last mentioned genus, the fertile hypha branches repeatedly in an irregularly dichotomous fashion, the outline of the branches and branchlets

being characteristically corrugated through the presence of successive constrictions, the ultimate divisions bearing the sporangioliferous heads. From the whole surface of the latter buds arise, distributed without great regularity, which as they develop become distinguished into two parts: a short stout basal stalk which later assumes the form of a nearly spherical vesicle, and a terminal rounded portion which becomes transformed into the broadly elliptical sporangiolum (figs. 3 and 4). In each sporangiolum three spores are normally produced by longitudinal radiate cleavage, but even in typical sporangiola instances occur in which one or all of these spores may divide before maturing, so that there may be four to six in the mature sporangiolum (figs. 5 and 7). In such cases the spores are more irregular in form, size, and arrangement. When fully mature, each sporangium becomes separated from its vesicle (fig. 6); or, if not quite matured, may be separated with the vesicle coherent, as in figs. 5 and 7. Ordinarily the vesicles are left attached to the sporangioliferous heads as is shown in figs. 2 and 3. The normal spores (fig. 9) are somewhat bean-shaped at first, tending to assume a more rounded form after they are freed from the sporangiolum, rather rich purplish brown in color, marked by longitudinal depressions which appear as fine dark lines, more or less parallel and slightly labyrinthine, which, when the spores are freshly discharged in water, are sufficiently conspicuous, although they become faint after swelling or mounting in glycerine. When viewed end on, as in fig. 8, the furrows give the margin a finely corrugated outline. From either pole in all the spores a variable number of very fine and hardly visible, irregularly divergent appendages radiate, which seem to be formed from an intersporal substance and converge to a more or less distinct cap or small mass of viscous material, which sometimes forms a distinct dark spot. These appendages are straight and very fine, seldom much longer than the spore, and are readily seen only in freshly separated spores and with considerable magnification. They seem to be entirely similar to the corresponding structures which are found on the sporangiospores of *Choanephora*. The spores germinate rapidly in nutrients by producing a terminal or lateral germ-tube which grows directly to a mycelium.

Under ordinary conditions sporangiola of the type just described are formed almost to the exclusion of other forms of sporangia; but, especially when the culture is made in a saturated atmosphere, typical sporangia appear, associated with them, having the normal structure of the ordinary sporangia of the Mucoraceae, and similar to those which occur in *Choanephora*. These sporangia, however, are subject to very great variation, and almost every imaginable intermediate condition between a form such as is represented in fig. 16, and the three-spored sporangium may be met with. These single sporangia when well developed, as in the instance just referred to, possess a typical columella, and contain very numerous spores, which are more uniform and usually smaller than such as occur in smaller sporangia. Their characters are in general similar to those of the spores formed in the sporangiola; they possess the same appendages, which are perhaps slightly longer and are similarly though less distinctly marked. Their color is often more reddish brown, but is variable. They may rarely be borne almost erect, but are usually nodding or strongly circinate, the termination of the sporangiophore in many cases being coiled in a more or less irregular spiral. Such large forms with small spores are far less frequent than smaller sporangia which show the greatest variability in size (figs. 13-15 and 17), some of which may be hardly larger than the typical sporangiola and like them may possess no columella (fig. 14). On the other hand, abnormalities or more simple conditions of the sporangium type of fructification occur which, like that illustrated in fig. 12, serve to break down any clean-cut distinction between the two types. The spores of the smaller sporangia are likely to be larger than those of better developed examples (figs. 13-15), and the walls are more coarsely roughened. The wall of the sporangiophore, and even sometimes of hyphae which bear sporangiola, may be roughened by a scaly incrustation, sometimes confined to the summit, sometimes extending to the base.

Chlamydospores are produced usually in enormous numbers, especially under unfavorable conditions, and vary considerably in form, from cylindrical to nearly spherical.

Although no "conidia" appear to be produced by this species, it is evident that it must be regarded as very closely related to

Choanephora, the peculiar characteristics of its sporangiospores being in themselves sufficient evidence of this relationship. But the chief interest which attaches to it rests upon the fact that the conidia so characteristic of *Choanephorae* are here replaced by sporangiola similarly related to large spherical heads; and further that these sporangiola, in the life history of one and the same species, pass by almost insensible gradations to large typical solitary sporangia such as are produced normally by a species of *Choanephora*. If, however, one compares the conidial fructification of *C. cucurbitarum*, for example, with the sporangiolate fructification of the present type, one is unavoidably impressed by the close correspondence between them, both in the form, peculiar color, and ornamentation of the spores, and in the similar origin of conidia and sporangiola from large spherical heads. The conclusion seems almost inevitable that in the conidia of *Choanephora* we are dealing with a condition in which the sporangiola of the present type are replaced by single spores which have been called conidia, but which should in all probability be regarded as monosporous sporangiola. On this supposition it might even be questioned whether the two types should be separated generically.

The writer has been unsuccessful in attempting to separate mechanically an outer thin wall from the colored and ornamented wall of the conidia in *C. cucurbitarum*; but that such a thin wall, corresponding to the sporangiolum wall, may actually be present is suggested by the fact that sometimes in normal heads, but more often in those in which the spore formation has been arrested or is in some way abnormal, one finds a condition like that represented in fig. 18A. In such instances the contents of the "conidium" has contracted away from the base of the thin colorless mother cell wall, and has surrounded itself with the characteristic purple "conidial" wall, which is clearly distinguished from the empty space below it, as is indicated in the figure cited. No indication has been seen, however, of the formation of more than one spore in this supposed sporangiolum. In all the species of *Choanephora*, moreover, the conidial heads when not primary arise from a primary head, not from a subdichotomously branched hypha-termination as in the present instance, and the distinction between sporangia and

monosporic sporangiola, if we may so call them, is wide and abrupt.

In the type represented by *Cunninghamella* it has been assumed that sporangia of the normal type are wholly lacking; but although none has been seen by persons who have cultivated any of the three described species of this genus, it by no means follows that they may not exist. In *Choaneophora*, where they are known to occur, it is often extremely difficult to obtain them, unless under special conditions of cultivation; and in the case of *C. cucurbitarum*, for example, one might continue cultures under ordinary conditions for an indefinite period without ever obtaining any but the conidial form. On the other hand, at least one species of *Choaneophora* is known to the writer, which was isolated by BLAKESLEE during his investigations on the Mucorales, and has never been seen to produce anything but normal sporangia with the typical appendiculate spores of this genus, although it was kept in cultivation for a period of years. As in this instance it cannot be assumed that "conidia" do not exist, so also in the case of *Cunninghamella* it remains to be determined whether sporangia of some sort are not occasionally produced under special conditions. In whatever way this question may be settled by further investigation, it is evident that the "conidia" of this genus, which are also borne on heads having the characteristics of the form-genus *Oedocephalum*, may, like those of *Choaneophora*, and with equal plausibility, be considered homologous with the sporangiola of the form under consideration.

In a recent paper on the reproduction of the Mucorales, MOREAU (Le Botaniste 13: nos. 1-3) has advanced the view that heads of the *Oedocephalum* type represent sporangia which have, as it were, been turned inside out; and that the sporangiospores thus exogenously produced are to be regarded as conidia. He would then trace to the sporangium thus metamorphosed all *Oedocephalum* conditions, isolated instances of which are known to occur among the higher fungi, *Polyporus annosus*, *Corticium effuscatum* in the Basidiomycetes, and species of *Aleuria* among the Discomycetes. The spores endogenously formed in the clavate or cylindrical bodies, which in *Syncephalastrum* replace the single spores of *Cunninghamella*, MOREAU also regards as conidia, and not as

sporangial spores, comparing them to the phaeophragmic spores of *Thielavia basicola*, in which the endospore may become more or less separable from the exospore before the disunion of the spore-segments. To the writer such an explanation seems highly improbable, nor does the presence of the *Oedocephalum* type in diverse and scattered instances among the higher fungi seem in the least significant in this connection; but rather as an indication that this simple and effective method of economizing space and raising a large number of spores above the substratum is a convenient type, which has been used independently by various unrelated groups, even by the Peronosporales.

The spores of *Syncephalastrum* appear to arise by internal, not always transverse, cleavage, rather than by transverse septation as in the phragmospores of *Thielavia basicola*, and the bodies which contain them are in the writer's opinion true sporangiola, from which it is a very short step to the "conidia" of *Cunninghamella*, which, as has been suggested, might be regarded as monosporic sporangiola. That monosporic sporangia are not an anomaly in the Mucorales is shown by the characters of the genus described below as *Haplosporangium*. This opinion seems further substantiated by the comparison already made between *Choanephora* and the present genus, the sporangiola of which are, as has been pointed out, but a short step from the "conidia" of the former, and are clearly shown to be sporangial in their nature, not only through the presence of intermediate forms, but by reason of their peculiar appendages so characteristic of sporangiospores in the Choanephorae.

In a majority of the other "Cephalideae" the conditions are superficially, though not fundamentally, different from those seen in *Syncephalastrum*, owing to a different arrangement for spore-dissemination. An intersporal substance is here present which causes the sporangiospores to cohere at first, and to separate only when this substance together with the sporangium wall becomes transformed to a somewhat viscous fluid; which, as in species of *Syncephalis*, causes all the spores formed on a given head to become united in a large viscous droplet, which adheres to small Drosophilidae and other insects frequenting the substrata on which they grow. In *Syncephalastrum*, on the other hand, the spore-mass when

ripe is quite dry, and spore-dissemination is probably for the most part accomplished by air currents. It is hardly necessary to mention that both these methods of dissemination occur, and may be associated, in other genera of the Mucorales, like *Mucor* and *Mortierella*.

In this connection it may be mentioned that since the publication of the writer's note on *Choanephora* (*Rhodora* 5:97) the common *C. cucurbitarum* has been cultivated in the Harvard Laboratories from Cuba, Porto Rico, Venezuela, and other localities, and that the culture, formerly mentioned as having been brought by the writer from La Plata, Argentina, which seemed to correspond to this species, has been contrasted with the plus and minus strains separated by BLAKESLEE from New England material of this species. As a result, the Argentine form produced abundant conjugations, forming perfect zygospores, which left no doubt as to its identity. The normal sporangia were also obtained by subjecting these forms to special conditions of moisture and nutrition, and were found to agree in all essentials with the figures and description given by MOLLER of his *C. americana*. Since, therefore, the ranges of the two overlap, and there seem to be no essential differences between them, the synonymy suggested in the *Rhodora* note may be regarded as finally established.

In addition to *C. cucurbitarum*, the writer has had in cultivation for some years two other American species. One of these was first obtained on *Hibiscus* flowers in the park at Palermo near Buenos Aires, and appears to correspond to *C. infundibulifera*, the secondary heads of which, unlike those of *C. cucurbitarum*, are persistent and become cupulate after the spores, which are smooth, have been shed. This species is very common on *Hibiscus* flowers in the West Indies, and is everywhere abundant in Grenada and Trinidad during the rainy season, where it was often seen by the writer fruiting abundantly on flowers which were still attached to the host plant, or even on buds that had apparently been hindered from opening by its growth. It has also been cultivated on material received from British Honduras and from Guatemala.

A third species, unlike either of the two just mentioned, was also found on flowers of Cucurbitaceae near Buenos Aires and was

kept in cultivation for eight years. Unfortunately, the culture ran out during the writer's absence in the West Indies. Although allied to *C. cucurbitarum*, this species differs in possessing smooth spores of a lighter red-brown color.

Dissophora, nov. gen.

Fertile hyphae abruptly differentiated from slender creeping vegetative filaments, stout, of indeterminate growth, and producing sporangiophores which arise as buds, continuously produced, behind its advancing apex. Sporangia and sporangiophores as in *Mortierella*.

Dissophora decumbens, nov. sp.—Plate XXVIII

Primary fertile hypha at first erect, then decumbent, stout, creeping over the substratum indefinitely, rarely septate, sometimes producing short branches; the sporangiophores arising irregularly from all sides immediately behind its growing apex, tapering somewhat at the base and apex, often septate when mature, rarely branched. Sporangia spherical, columella none, spores spherical or irregularly somewhat angular from pressure; the whole clear white at first, the sporangia becoming slightly yellowish. Primary fertile hyphae up to 10 mm. or more in length, 10–16 μ in diameter. Sporangiophores 100–150 $\times$ 8 μ . Sporangia 17–23 μ . Spores about 4 μ .

On dung of wood mouse from vicinity of Cambridge.

This species was cultivated for several years, but like the two succeeding forms was unfortunately lost during the writer's absence from Cambridge, so that the accompanying figures and description have been made from mounts and dried material. Although very closely allied to *Mortierella*, the peculiarities of the primary fertile hypha, which is unlike that of any others of the Mucorales, has seemed sufficient basis for generic separation. The fructification is pure white and easily distinguished among other fungi with which it may be growing. At first it is erect, but soon becomes decumbent, the older prostrate axis being left behind by the constantly advancing apex (figs. 19 and 26), and reaches a considerable and

more or less indefinite length. Immediately behind the blunt stout apex scattered buds arise (fig. 26), which soon become clavate branches, slightly divergent or even appressed, and as one traces these branches backward from the tip a gradual transition is seen from the first buds to the fully matured sporangiophores (figs. 19 and 20), and when the older portions of the axis are reached, the old sporangiophores alone are found from which the sporangia have disappeared (fig. 21). In a few instances the sporangiophores have been seen to be replaced by a branch on which two or several sporangiophores may be borne. As the latter become fully mature, and when the spores are ripe, one or more septa usually make their appearance and may also occur in the older parts of the fertile axis at considerable intervals. The latter originates from very slender hyphae running on the substratum and are very abruptly distinguished from them (fig. 25). Whether the mycelium is parasitic as it grows in nature has not been determined, but it develops very readily on potato agar without the presence of any host.

Haplosporangium, nov. gen.

Mycelium of slender branching filaments forming a felted layer on the surface of which numerous intercalary or terminal portions become differentiated, forming a superficial network of stout, often septate, segments, or series of segments, of variable length; from which sporangiophores are radiately produced, of characteristic form, broad at the base and attenuated distally to a threadlike termination which bears the primary sporangium and may be subtended by one, rarely two, threadlike secondary sporangiophores. Sporangia monosporous or bisporous.

The species of this genus differ from those of *Mortierella*, to which they are closely allied, in the presence of highly differentiated often very long segments, from which arise peculiar sporangiophores bearing threadlike terminations or lateral branches, on which are produced minute sporangia containing usually only one, sometimes two, spores. The sporangiferous segments are very characteristic and variable, forming a network on the surface of the mycelial web, crossing it in all directions, and lying parallel to the substratum; sometimes a mere swelling from which a single spo-

rangiophore is produced, but often elongate and bearing large numbers of the latter which arise from all sides without regularity.

The genus resembles *Dissophora* in possessing specialized structures from which the sporangioophores arise, but is clearly distinguished from the fact that these structures are intercalary and determinate, as well as by its peculiar sporangia. In general appearance, and in its habit of producing its sporangioophores in a radiate fashion from the segments of repent filaments, it closely resembles certain hyphomycetous forms like *Hyalopus* or *Cephalosporium*, and it was at first mistaken for an imperfect fungus of this nature when examined with a hand lens. The sporangia are very minute, even when they contain two spores, and the plant would hardly be taken for one of the Mucorales unless examined with some care. The presence of numerous septa in the sporangiferous segments also serves to render the general appearance of the fungus deceptive.

Both the species described below have been cultivated on nutrient agar, one of them for nearly twenty years; but, as has been previously mentioned, both were recently lost, and the material now available consists of dried specimens and glycerine mounts. In the accompanying figures no attempt has been made to represent the general appearance of the mesh of sporangioophoric segments which, though very striking in appearance, is too intricate for satisfactory drawing. The segments illustrated are small, but many occur which may reach a millimeter or more in length, with more or less clearly marked constrictions where septa occur. They are rigid and usually very straight, tapering off at the ends to fine filaments which may at once pass into another segment, or branch and run for a considerable distance before this occurs.

Haplosporangium bisporale, nov. sp.—Plate XXIX

Clear white becoming yellowish with age, forming a dense cobweb-like layer on the substratum, composed of slender filaments connecting the fertile segments which form the greater portion of the layer and may be very short, producing only a single sporangioophore, or may reach more than a millimeter in length and produce large numbers of the latter developed at right angles and in all

directions. Sporangioophores simple or rarely furcate, the abruptly attenuated extremity usually straight or but slightly bent, and bearing the primary sporangium; one, or less often two, secondary sporangia borne on short straight fine branchlets which project at right angles, or may be bent slightly downward, and are opposite when two are present. Primary and secondary sporangia minute, spherical, smooth; containing one spherical spore, or less frequently two, which are subhemispherical in shape, becoming somewhat rounded. The spores hyaline, often, but not always, distinctly roughened. Bisporous sporangia $11-12\ \mu$; monosporous $8\ \mu$. Sporangioophores, average, $48-55 \times 5\ \mu$. Hyphae $1-3\ \mu$, segments to $6.5\ \mu$ in diameter.

This form was first found on pig dung at Burbank, E. Tennessee, more than twenty years since, and has since been observed at Kittery Point, Maine, on dung of skunk and of field mice, and also at Intervale, New Hampshire, on dung of squirrels.

The species appears to be not very rare, and has probably escaped notice from its resemblance to some very insignificant hyphomycetes of the *Hyalopus* type. Although all the strains examined produce two-spored sporangia, which are in some cultures very abundant, in one instance at least they are very rare, and may be found only after long-continued search among the predominant one-spored type. Both the primary and secondary sporangia may produce two spores without regularity and on the same sporangioophore; a one-spored primary sporangium may even be associated with a two-spored secondary one. Both this and the succeeding species grow readily on rat-dung agar, fruiting abundantly.

Haplosporangium decipiens, nov. sp.—Plate XXIX

Similar to the last. The sporangioophores on the average constantly somewhat larger, the sporangia always one-spored and nodding, the sporangium wall roughened by minute folds, the spores spherical and smooth. Sporangioophores, average $60-65\ \mu$. Sporangia $8-10\ \mu$.

This species, although it has been cultivated from the original material, has been seen but once and was found on dung of the curious cave-dwelling

Selenodon from Hayti. It seems sufficiently well distinguished from the preceding species by its roughened nodding sporangia, smooth spores, which are always solitary in the strain examined, and its slightly larger dimensions. It is not impossible, however, that strains may occur in which two spores may be produced in single sporangia, as in *H. bisporale*.

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EXPLANATION OF PLATES XXVI-XXIX

The figures have been drawn with a camera lucida and reduced in reproduction. The objectives used, Zeiss dry and Leitz water immersion, are indicated in each case, and also the eyepiece numbers.

PLATES XXVI AND XXVII

Blakeslea trispora Thaxter

FIG. 1.—Habit of moderately well developed group of heads bearing sporangia, showing a portion of the fertile hypha and its origin; D2.

FIG. 2.—Group of heads denuded of sporangia; D2.

FIG. 3.—Single head with five sporangia attached, showing corrugation of branchlets below heads; water im. 4.

FIG. 4.—The same in optical section, much younger; the spores not yet mature in the sporangia; water im. 4.

FIG. 5.—Sporangium mature, with adherent basal piece and containing six spores; water im. 4.

FIG. 6.—Normal three-spored sporangium; water im. 4.

FIG. 7.—Sporangium with four spores, the basal piece adherent; water im. 4.

FIG. 8.—Three-spored sporangium seen in optical section from above; water im. 4.

FIG. 9.—Four spores from sporangia; water im. 12.

FIG. 10.—Chlamydospores; D4.

FIG. 11.—Fertile hyphae from the irregularly swollen end of which five small sporangia were produced intermediate in character between sporangia and small normal sporangia; water im. 4.

FIG. 12.—Fertile hypha with single head bearing more normal sporangia; water im. 4.

FIGS. 13-17.—Different variations seen in normal sporangia; water im. 4.

FIG. 18.—Sporangial spores from the sporangium shown in fig. 16; water im. 12.

Choanephora cucurbitarum

FIG. 18A.—Two "conidia" showing thin membrane inclosing space below the single spore and suggesting a monosporangium; water im. 12.

PLATE XXVIII

Dissophora decumbens

FIG. 19.—Terminal portion of a fertile hypha in two parts, showing origin and progressive development of sporangiophores; A4.

FIG. 20.—Portion of a fertile hypha bearing mature sporangiophores, in which septa have begun to appear; D4.

FIG. 21.—Older portion of same bearing naked septate sporangiophores; D4.

FIG. 22.—Termination of sporangiophore from which sporangium has disappeared; water im. 12.

FIG. 23.—The same bearing a mature sporangium; water im. 12.

FIG. 24.—Sporangiospores; water im. 12.

FIG. 25.—Origin of fertile hypha from vegetative hypha; D4.

FIG. 26.—Terminal portion of fertile hypha showing origin of sporangiophores behind growing apex; D4.

PLATE XXIX

Haplosporangium bisporale

FIG. 27.—Sporangiferous segments, small and of moderate length, bearing sporangiophores or just budding to form them; D4.

FIG. 28.—Small segments each giving rise to one or two sporangiophores and connected by slender isthmuses; D4.

FIGS. 29–32. Sporangiophores bearing one, two, or three one- or two-spored sporangia; water im. 4.

FIG. 33.—Mature bisporangium; water im. 12.

FIG. 34.—Two spores from a bisporangium still adherent; water im. 12.

FIG. 35.—The same separated; water im. 12.

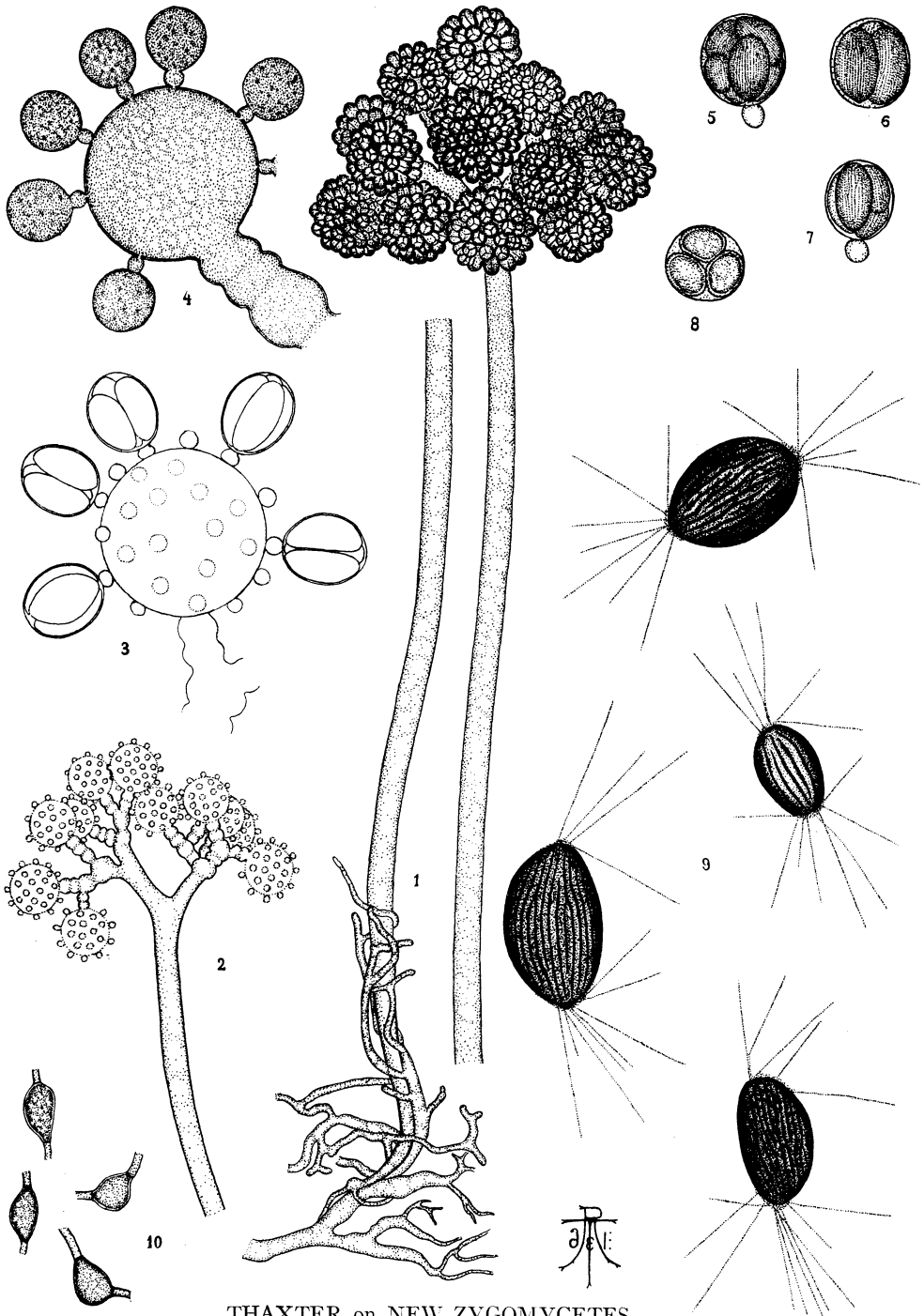
FIG. 36.—Spore from monosporangium; water im. 12.

Haplosporangium decipiens

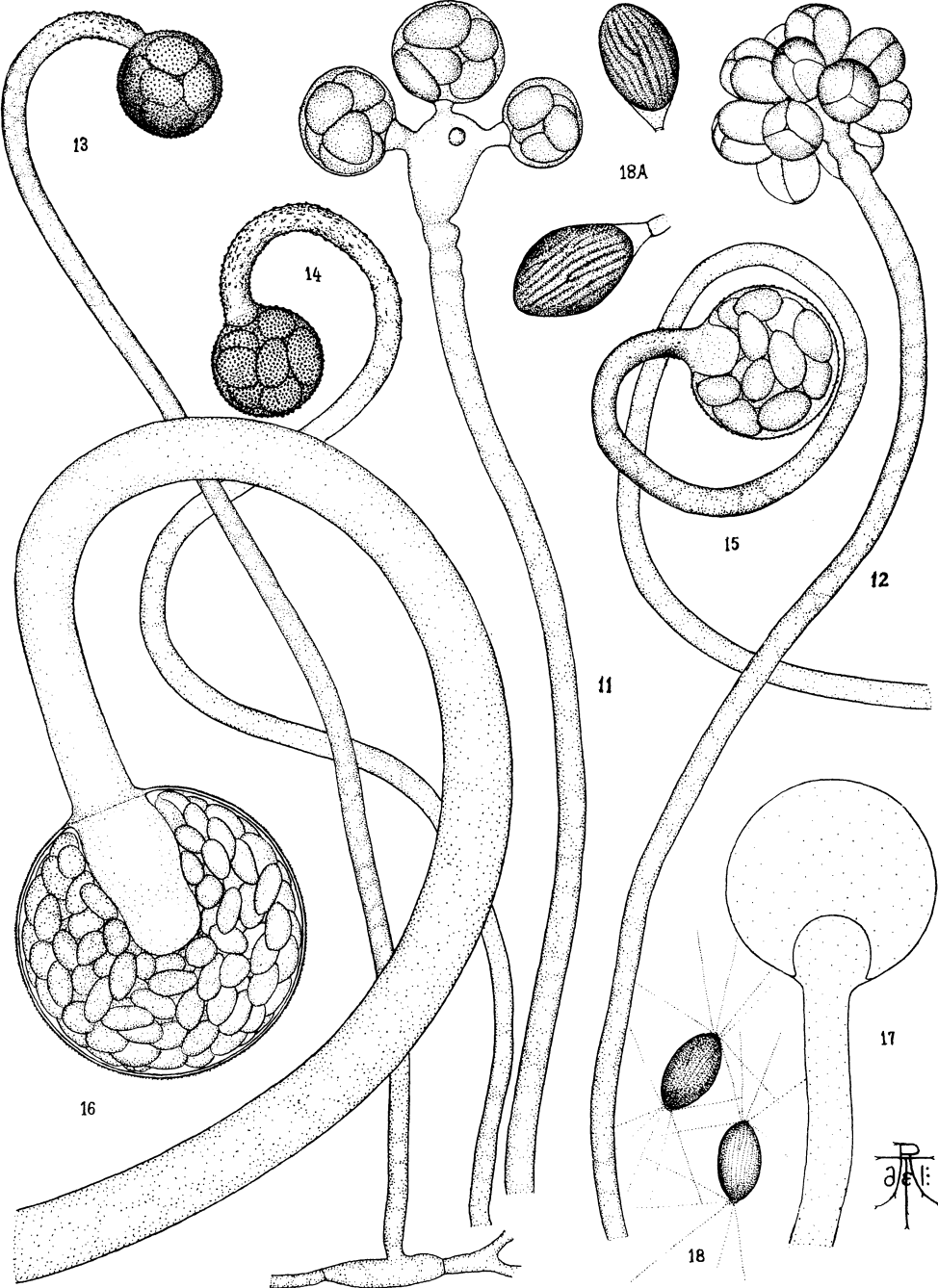
FIG. 37.—Small segments bearing sporangiophores; water im. 4.

FIG. 38.—Sporangiophores; water im. 4.

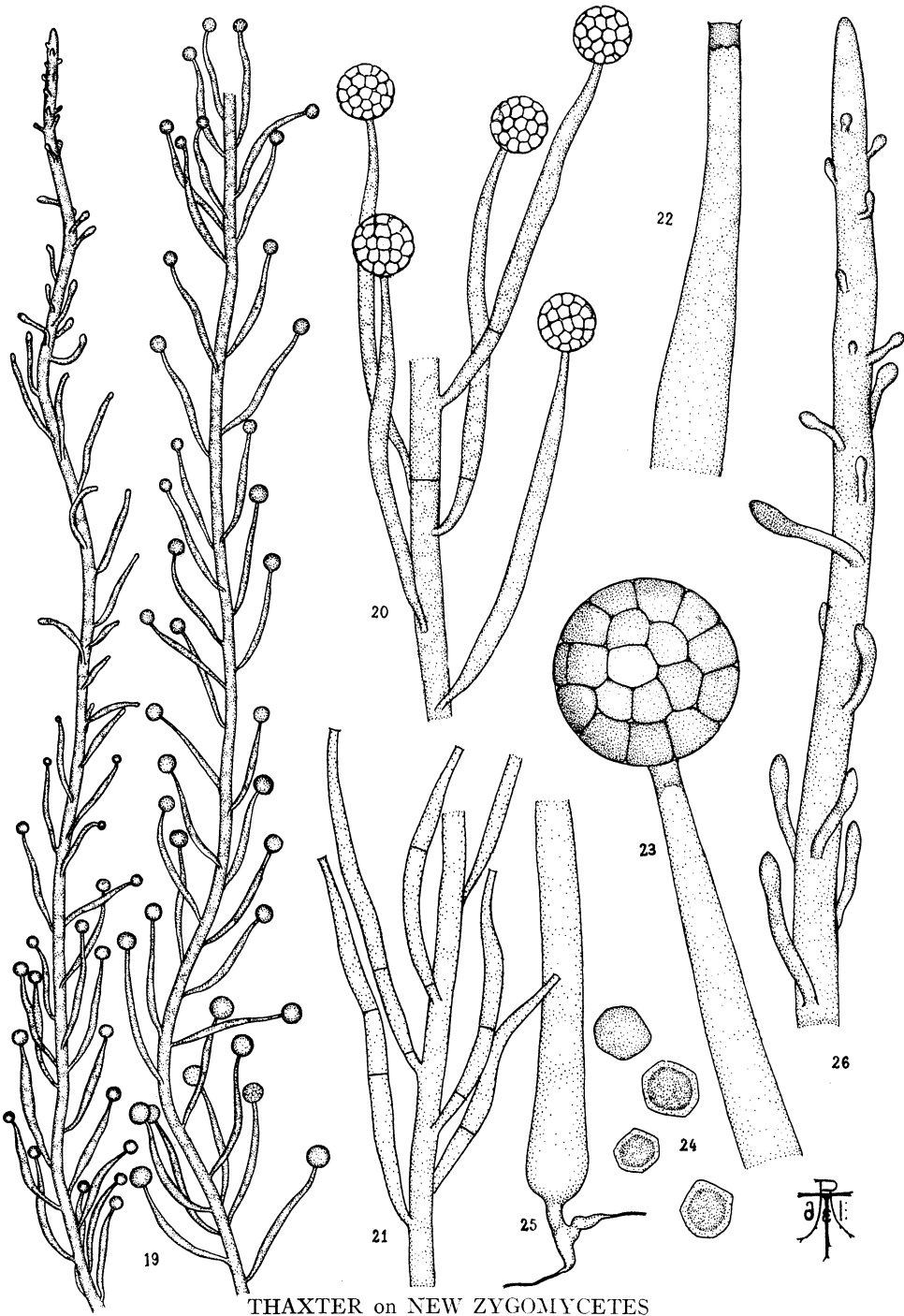
FIG. 39.—Monosporangium with its single spore; water im. 12.



THAXTER on NEW ZYGOMYCETES



THAXTER on NEW ZYGOMYCETES



THAXTER on NEW ZYGOMYCETES

